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Title: Universal photon statistics below a bifurcation threshold

Abstract:

At a bifurcation point, a small change of a parameter causes a qualitative change in the system. Quantum fluctuations wash out this abrupt transition and enable the emission of quantized energy, which we term photons, below the classical bifurcation threshold. Close to the bifurcation point, the resulting photon counting statistics is determined by the instability. We propose a generic method to derive a characteristic function of photon counting close to a bifurcation threshold that only depends on the dynamics and the type of bifurcation, based on the universality of the Martin- Siggia-Rose action. We provide explicit expressions for the cusp catastrophe without conservation laws. Moreover, we propose an experimental setup using driven Josephson junctions that exhibits both a fold and a pitchfork bifurcation behavior close to a cusp catastrophe.